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## A PRELIMINARY REVIEW OF THE NORTH AMERICAN DECTICIDÆ.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

Having recently put my own collection of Decticidæ into systematic order and treated the collection of the U. S. National Museum entrusted to me by Dr. C. V. Riley in a similar manner, I have thought it would assist in obtaining better material for a future monograph if I were to publish at least a generic discrimination of the material at hand. At the same time I am able to clear up most of the synonymy of the species and assign to their proper location the various described species, very few of which (7 out of 23) will be found to have been originally placed in the genera to which they are here assigned. This is partly because it has been necessary to establish new generic categories for a large number of our species, which are very insufficiently known, having awaited a student ever since Herman's sketch of the genera of Decticidæ twenty years ago. In the course of another year I hope to make a complete study, and not only to characterize the genera more carefully, but to describe the numerous species here indicated. It is evident that in the West a considerable number of species are likely to occur additional to those now known to me, which number about fifty, divided among fifteen genera, five of which are monotypic, and only one of which is found also in the Old World. Much might be said regarding the geographical distribution of the genera, but I will reserve that for a future occasion.

### TABLE FOR THE DETERMINATION OF THE GENERA OF N. A. DECTICIDÆ.

- a1. Prosternum armed with two erect spines.
  - b1. Four terminal spines on the lower side of the hind femora, two smaller ones between a larger pair.
    - c1. Ovipositor straight.
      - d1. Prosternal spines short, obtuse. . . . . *Engoniaspis*.
      - d2. Prosternal spines long and slender, sub-acute . . . . . *Atlanticus*.

- c 2. Ovipositor arcuate.
- d 1. Ovipositor curved downward; a median carina on the prothorax.....*Drymadusa*.
- d 2. Ovipositor curved upward; no median carina on prothorax.....*Orchesticus*.
- b 2. Two terminal spines only (the outer) on lower side of hind femora.....*Tropizaspis*.
- a 2. Prosternum unarmed.
- b 1. Fore tibiæ spined above on both margins.
- c 1. Large bulky insects; tegmina of ♂ almost completely concealed beneath the pronotum; eyes but little larger than antennal scrobes....*Anabrus*.
- c 2. Relatively small insects; exposed portion of ♂ tegmina half as large as pronotum; eyes fully twice as large as antennal scrobes.....*Cacopteris*, p. p.
- b 2. Fore tibiæ spined above on outer margin only.
- c 1. Fore tibiæ with several spines above on outer margin.
- d 1. Fore tibiæ with three spines above on outer margin.
- e 1. Legs short, the hind femora scarcely or not extending beyond abdomen; surface of pronotum granulate.....*Peranabrus*.
- e 2. Legs long, the hind femora extending far beyond abdomen; surface of pronotum smooth.
- f 1. Pronotum without distinct lateral carinæ, except sometimes posteriorly; a median carina rarely present and then weak.
- g 1. Pronotum transversely arched as much on the posterior as on the anterior half.
- h 1. Ovipositor straight.....*Cacopteris*, p. p.
- h 2. Ovipositor arcuate.....*Eremopedes*.
- g 2. Pronotum laterally subangulate posteriorly, and often with a slight median carinula.....*Idiostatus*.

- f 2. Pronotum with distinct lateral and median carinæ, the latter sometimes weak.
- g 1. Lateral carinæ of pronotum parallel or subparallel. . . . . *Steirosys*.
- g 2. Lateral carinæ approximated in middle of anterior half of pronotum, so as to narrow the dorsum by nearly one-half. . . . . *Idionotus*.
- d 2. Fore tibiæ with four spines above on outer margin.
- e 1. Descending lobes of pronotum declivent, the dorsum narrow. . . . . *Clinopleura*.
- e 2. Descending lobes of pronotum narrow, the dorsum broad. . . . . *Plagiostira*.
- c 2. Fore tibiæ with only one spine above on outer margin, situated at apex. . . . . *Ateloplus*.

ENGONIASPIS, Brunner (Rév. Syst. Orth., 185).

No species of this genus has yet been described. Brunner founded it upon a species from Missouri, in his collection, which is very likely the same as that represented in the Riley collection of the U. S. National Museum by an imperfect specimen from an unknown locality.

ATLANTICUS (ἀτλαντικός) Gen. nov.

This generic name is proposed for the only species of Decticidæ (except some species of *Orchesticus*) that occur on the Atlantic slope of North America, and are confined to that district, or at least to the region east of the Mississippi. They resemble the European *Thamnotrizon* in general appearance, but have a spined prosternum. They are closely related to *Engoniaspis*, but the males are not apterous, the prosternal spines are well developed and the cerci are not depressed. Three species are known to me, two of them long ago described by Burmeister under the names of *Decticus dorsalis* and *D. pachymerus* (one of them, probably the latter, afterwards described by Walker as *Decticus derogatus*), and a third, which appears to be a more southern and robust form, represented in my collection by two pairs coming from North Carolina to Florida. These species may be thus distinguished:—

Inner tooth of ♂ cerci short; lateral carinæ of pronotum sharply pronounced.

- Hind femora less than twice as long as the pronotum ; exposed portion of ♂ tegmina almost as ample as the pronotum..... *pachymerus*.  
 Hind femora more than twice as long as the pronotum ; exposed portion of ♂ tegmina less than one-third as ample as the pronotum..... *dorsalis*.  
 Inner tooth of ♂ cerci long ; lateral carinæ of pronotum not sharply pronounced..... *gibbosus*.

DRYADUSA Stein (Berl. Ent. Zeitschr., IV., 257).

Recognized in an undescribed species in my collection, represented by a single ♀ from Oregon, in which the tegmina are very abbreviated and the ovipositor apically decurved. The genus has not before been known to occur in the New World, and appears to be the only genus of Decticiidæ common to the two worlds. I have no European species with which to compare it, but from the description of the genus it seems to belong here, though the pronotum has a distinct median carina posteriorly.

ORCHESTICUS Saussure (Rev. Mag. Zool., 1859, 201).

This genus was founded upon a species from Tennessee, *O. americanus*, Sauss., unknown to me. The genus is, however, the richest in species of any of our Decticiidæ, no less than six nominal species having been described, some of them (not yet carefully studied) possibly synonymous, and all, excepting the typical species, described under other generic names. These are, to give them in the order of their publication : *Anabrus haldemani* Girard, *Anabrus minutus* and *A. stevensonii* Thomas, and *Thyreonotus cragini* and *T. scudder* Bruner. All of these are from the Mississippi Valley and the mountain region on the west, which seem to be the home of the genus, though it occurs also sparingly on the Atlantic slope. In a preliminary arrangement of the species in the collections at hand I have separated about a dozen species.

TROPIZASPIS Brunner (Rév. Syst. Orth., 187).

To this genus belongs *Arytropteris steindachneri* Herm., from Puget Sound. The genus seems to be peculiar to the Pacific Coast, from whence half a dozen species are known to me, none but the above described, and this not heretofore referred to the present genus.

## ANABRUS Haldeman (Stansb., Salt Lake, 372).

This genus was founded upon a species from Salt Lake, *A. simplex*, and the genus seems to be mainly confined to the elevated country west of the Mississippi prairies. Three other nominal species have been described, *A. purpurascens* Uhl., *A. similis* Scudd., and *A. coloradus* Thom., but whether these are all distinct or are all that exist in our collections, I have not yet endeavoured to determine. All the above, however, certainly belong to Anabrus, but three others, originally described as Anabri, belong, as noted above, to Orchesticus.

## PERANABRUS, Gen. nov.

This generic name is proposed for *Thamnotrizon scabricollis* Thom., from Southern Montana, which, except for its scabrous pronotum, has much the aspect of an Anabrus. It differs from it, however, in lacking spines upon the inner margin of the fore-tibiæ above, and in its distinctly carinate pronotum. It is poorly figured by Glover in his Ill. N. A. Ent., Orth., pl. 13, fig. 6.

## CACOPTERIS (κυκός, πτερόν), Gen. nov.

This genus, containing half a dozen species of minor size, none of which have been described, is remarkable for the fact that the inner margin of the upper surface of the fore-tibiæ is sometimes spined and sometimes unarmed; generally individuals of the same species seem to be always either one or the other, but in at least two of them, individuals of the same species differ in this respect, the males being more frequently spined than the females; when armed, there are always three spines present. The genus is peculiar to California and Western Nevada and the southern margin of the United States as far east as the upper Rio Grande. It has somewhat the aspect of the European Antaxius.

## EREMOPEDES (έρημος, πηδάω), Gen. nov.

Founded on an Arizona species, of which a single ♀ is in the U. S. National Museum. It has a very uniformly rounded, slightly compressed body, with a general resemblance to the smaller forms of Orchesticus.

## IDIOSTATUS Pictet (Mém. Soc. Phys. Gen., XXX., vi. 63).

Two species of this genus have been described; a smaller, *I. hermanni* (*Steiroxys hermanni* Thos. = *Idiostatus californicus* Pict.), and a larger, *I. bilineata* (*Steiroxys bilineata* Thom.), and there is what is apparently a third species, with excessively long ovipositor, in the U. S. National Museum. All the species come from California and Oregon.

STEIROXYS Hermann (Verh. Zool.-bot. Ges. Wien, XXIV. 207).

We possess three species of this genus, two of which have been described: *S. trilineatus* (*Thamnotrizon trilineatus* Thom.), the type of the genus from Wyoming and Utah, and *S. pallidipalpus* (*Decticus pallidipalpus* Thom.), from Utah, Idaho and Nevada; and apparently a third species from Northern California, Oregon and Alberta, which may be called *S. borealis*. They may be distinguished as follows:—

Abdomen conspicuously ornamented with a median series of V-shaped black spots..... *trilineatus*.

Abdomen with no conspicuous median abdominal markings.

Hind femora very long, more than three and a-half times longer than the pronotum; dorsal field of pronotum much less than twice as long as greatest breadth..... *borealis*.

Hind femora not so long, being scarcely more than three times as long as the pronotum; dorsal field of pronotum almost twice as long as greatest breadth..... *pallidipalpus*.

IDIONOTUS (ἴδιος, νότος), Gen. nov.

This genus is established on a couple of undescribed species, one in the U. S. National Museum, from California, the other in my own collection, collected by Kennicott somewhere on his explorations in or going to Alaska. It closely resembles *Steiroxys*.

CLINOPLLEURA (κλίνω, πλευρά), Gen. nov.

This name is proposed for *Steiroxys melanopleura* Scudd., and its allies. It is nearly related to the European *Psorodonotus*, but is abundantly distinct, with no such prolonged pronotum. The typical species comes from Southern California and Utah, and two other Californian species are in the U. S. National Museum.

PLAGIOSTIRA Scudder (Wheeler's Ann. Rep., 1876, 501).

Founded upon *P. albonotata* Scudd., from Northern New Mexico. I have what is apparently a second and larger species of uniform colouring, but in poor condition, taken on the surveys for the Northern Pacific R. R.

ATELOPLUS (ἀτελής, ὄπλον), Gen. nov.

A peculiar form, apparently nearly allied to *Idiostatus* and *Cacopteris* and closely resembling them in general appearance, but remarkable for having both margins of the upper surface of the fore-tibiæ entirely devoid of spines, except a single one at the apex on the outer side. I know of but one species, from San Diego, California, represented by a single ♀ in the U. S. National Museum.

The following alphabetical list shows the genera to which the described species are here referred, with initial bibliographical references:—

- Anabrus coloradus* Thom., Rep. Hayd. Surv., V., 440 (*Anabrus*).  
 " *haldemaniai* Gir., Marcy Expl. Red Riv., 259 [248], pl. 15, figs. 5-8 (*Orchesticus*).  
 " *minutus* Thom., Proc. Philad. Acad., 1870, 1875 (*Orchesticus*).  
 " *purpurascens* Uhl., Proc. Ent. Soc. Philad., II., 550 (*Anabrus*).  
 " *similis* Scudd., Hayd. Rep. Nebr., 249 (*Anabrus*).  
 " *simplex* Hald., Stansb., Expl. Utah, 372, pl. 10, fig. 4 (*Anabrus*).  
 " *stevensonii* Thom., Proc. Philad. Acad., 1870, 1875 (*Orchesticus*).  
*Arytropteris steindachneri* Herm., Verh. Zool.-bot. Ges. Wien, XXIV., 204-205, figs. 98-102 (*Tropizaspis*).  
*Decticus derogatus* Walk., Cat. Derm. Salt Brit. Mus., II., 260 (*Atlanticus pachymerus*).  
 " *dorsalis* Burm., Handb. Entom., II., 713 (*Atlanticus*).  
 " *pachymerus* Burm., Handb. Entom., II., 712 (*Atlanticus*).  
 " *pallidipalpus* Thom., Fin. Rep. Hayd. Surv., V., 442 (*Steiroxys*).  
 " *sphagnorum* Walk., Cat. Derm. Salt Brit. Mus., II., 258-259 (Not a Dectid).  
*Idiostatus californicus* Pict., Mem. Soc. Phys. Gen., XXX., vi., 64-65, figs. 35, 35a (*Idiostatus hermanni*).  
*Orchesticus americanus* Sauss., Rev. Mag. Zool., 1859, 201 (*Orchesticus*).  
*Plagiostira albonotata* Scudd., Ann. Rep. Wheel. Surv., 1876, 501 (*Plagiostira*).  
*Steiroxys bilineata* Thom., Fin. Rep. Wheel. Surv., V., 905 (*Idiostatus*).  
 " *hermanni* Thom., Fin. Rep. Wheel. Surv., V., 904, pl. 44, fig. 4 (*Idiostatus*).  
 " *melanopleura* Scudd., Ann. Rep. Wheel. Surv., 1876, 500 (*Clinopleura*).  
*Thamnotrizon scabricollis* Thom., Fin. Rep. Hayd. Surv., V., 441 (*Peranabrus*).  
 " *trilineatus* Thom., Proc. Philad. Acad., 1870, 1876 (*Steiroxys*).  
*Thyreonotus cragini* Brun., Bull. Washb. Lab., I., 129 (*Orchesticus*).  
 " *scudderi* Brun., Bull. Washb. Lab., I., 129-130 (*Orchesticus*).

All known North American Dectidæ are apterous or subapterous, their tegmina never extending over more than two abdominal segments or thereabouts. But many European species are fully winged, and such



forms should be looked for in America, especially in the West. To the beginner it should be added that by no means all apterous or subapterous Locustarians are Decticidæ, as witness the ubiquitous *Centhophili*; but Decticidæ may be distinguished from other Locustarians (to follow Brunner's latest table for their separation) by having the tarsi more or less depressed (the *Stenopelmatidæ* have them distinctly compressed); by the presence of foramina near the base of the anterior tibiæ (wanting in *Gryllacrididæ*); by having the antennæ inserted between the eyes, nearer the summit of the occiput than the upper margin of the labrum (instead of the opposite); by having the first two tarsal joints longitudinally sulcate on the sides; by having the fore-tibial foramina slit-like rather than elliptical; by the presence of an apical spine on the outer side of the fore-tibiæ above (wanting, however, in a single African genus of Decticidæ); and by the presence of a free plantula at the base of the first hind tarsal joint beneath, this last character separating them from the *Locustidæ* proper, where the plantula is not free.

### BOTYS URTICALOIDES, N. S.

BY THE REV. THOMAS W. FYLES, SOUTH QUEBEC.

Expanse of wings one and one-fourth inches. Length of body six-tenths of an inch. Head and antennæ black. Thorax, above black bordered with white, beneath white. Legs white. Wings white, satiny, translucent. Primaries have a slight tinge of yellow. On the costa, near the middle, are two black or dark brown blotches; below these, towards the inner margin, are two other blotches, sometimes united—the whole forming a broken, transverse band. Beyond this, near the hind margin and extending from near the inner angle for about two-thirds of the width of the wing, is a second, narrower band. Secondaries have a roseate tinge. Abdomen above black, the segments bordered with white, and the extremity tipped with white; beneath white.

Described from four specimens, taken all at one time and flying by day, in an "intervale" of Brome County, Province of Quebec.

Only one other specimen of this insect has, as far as I can learn, been taken. It was discovered by Mr. Ashmead and Mr. Linell amongst unnamed material in the National Museum at Washington, D. C.

## DESCRIPTIONS OF THE LARVÆ OF CERTAIN TENTHREDINIDÆ.

BY HARRISON G. DYAR, NEW YORK.

*Blennocampa bipartita*, Cresson.

A single fly, bred from a larva on oak at Boston, Mass., appears to belong to this species. The fly differs from Mr. Cresson's description in that all the tarsi are blackish; the abdomen above is largely blackish; there is no luteous tint discernible on the lateral margin of middle lobe of mesothorax; the anterior and posterior margins of the luteous stigma are blackish and the veins are nearly black. There are two black points in the upper medial cell and one in the second submarginal cell on forewings. The larva seems to closely resemble that described in the 5th report U. S. Entom. Commission, p. 206, as *Monophadnus dilutus*, Cresson, but the fly belongs to a different genus.

*Larva*.—Sitting flat on the young leaves of the black oak and eating holes through; solitary. Head wider than high, rounded above; smooth green; eyes black, with a blackish stripe from each to vertex, and two contiguous black spots on upper part of clypeus; width, 1.4 mm. Abdominal feet present on joints 6-11 and 13 (20 feet). Body smooth, not annulate, the subventral region folded. Colour uniform green. Two transverse rows on each segment of Y-shaped furcate processes, in a longitudinal plane, arranged as follows: Addorsal, two; subdorsal, two; substigmatal, one; subventral, two, not in line, one below the other. The anterior and posterior processes are tipped with black. Length, 12 mm.

*Final stage*.—The larva moulted and entered the ground. Smooth, annulated, with slightly elevated, concolorous warts instead of processes, inconspicuous. Pale greenish, concolorous; head pale testaceous; width, 1.4 mm.

The larva formed an elliptical cell in the ground, lined with a black secretion, about the first of June. The fly emerged the following April.

*Emphytus canadensis*, Kirby.

(The pansy saw-fly.)

7 ♀ ♀. The flies differ slightly from Provancher's description in having the fore and middle tarsi dusky toward tips, while the veins and stigma are black, rather than dark brown.

*Larva*.—Eating the whole leaf, curled spirally on the back; falls off when disturbed. Head rounded, normal, dull black, slightly slaty; eye

and mouth black, the sutures around clypeus pale; some short, pale hairs; width, 1.4 mm. Body of nearly equal width, slightly largest at anterior end; thoracic feet small, abdominal ones well developed, present on joints 6 to 13 (22 feet). Segments 6-annulate, rather sharply so, and about as distinct as the segmental incisures. Colour slaty black dorsally, not shining, smooth, the dorsal vessel showing darker; below the spiracles olive gray. Thoracic feet pale. On each segment, on 2nd annulet, a transverse row of minute white points, with a second one on 1st annulet stigmatically; a few less conspicuous ones on subventral ridge.

*Final stage.*—Head blackish above, pale below; eye in a black spot; mouth brown; antennæ and palpi pointed, minutely brown ringed; width, 1.4 mm. Body entirely dark olive-gray, rather bluish, slaty, the segments neatly 6-annulate, not shining, evenly minutely granular. Feet transparent, spiracles in paler areas. No white points or tubercles.

The larvæ do not feed in this stage, but seek for decayed or soft wood in which they bore a gallery to serve as a place for pupation.

Larvæ abundant on cultivated pansies at Plattsburg, N. Y., in September, the flies emerging the following April.

*Emphytus cinctipes*, Norton.  
(The rare rose saw-fly.)

Eating the whole leaf and resting on the back, curled spirally, with the anal end on top. Head well rounded, flat over clypeus, pale brown, the ocellus in a round black spot; mouth blackish, not shining; a blackish longitudinal stripe on vertex of head. Width, 1.5 mm. Abdominal feet present on joints 6-12 and 13 (22 feet); thoracic feet large, visible from the dorsal aspect, spreading, but not greatly so. Rather dark green dorsally and in spots along the bases of the legs; whitish subtranslucent subventrally and ventrally and on the feet. Minute pointed, conical, white dots arranged in three transverse rows on each segment on the first, second and fourth annulets; on the first annulet, two each side subdorsally; on the second and fourth annulets, two subdorsally and two laterally and others substigmatically; but these last are very inconspicuous on the pale ground colour. Tracheæ showing by transparency as a white cord. The green colour becomes darker posteriorly and is interrupted at joint 12, showing that it is partly due to the food in the alimentary canal.

*Final stage.*—Head shining, slightly punctured, pale straw-yellow, with large black eye spot; width, 1.5 mm. Body smooth, 6-annulate, without any tubercles, coloured as before, but paler. Dorsal colour bluish-

green, especially on joint 2. A little later the black shade reappears on the vertex of head, and the dorsal colour of the body becomes dark green. The larvæ do not feed in this stage, but enter the ground and form a cell lined imperfectly and with fragile walls.

Larvæ on cultivated rose bushes at Boston, Mass., in June, the flies emerging in July.

*Nematus monochroma*, Norton.

6 ♂♂, 4 ♀♀. The ♀ differs from Norton's description only in having the antennæ black, including the two basal joints, and the tarsi dusky. It differs from the descriptions of *N. ocreatus*, Harrington, and of *N. mellinus*, Cresson, in having no black marks on the thorax or abdomen. The metathorax and basal plates are marked with dark brown. The ♂ is like the ♀ below, but above it is largely black. A black patch covers the whole top of the head behind the antennæ, except a narrow border to the eyes. Thorax above shining black; tegulæ and posterior angles of prothorax pale. Abdomen black above, except at the extreme tip. In other specimens the black is more extensive, staining the sides below the insertion of the wings and the whole tip of abdomen.

*Larva*.—Gregarious, holding to the edge of a leaf by the thoracic feet. Head smooth, shining black, a little paler around the mouth or else entirely pale testaceous, with the eye black; width, 1.3 mm. Body green, slightly shining, annulate; abdominal feet present on joints 6-11 and 13 (20 feet), but very small on joint 13. Two transverse rows per segment of elevated black spots, minute on the back, confused laterally and larger, especially two subventral ones. Spots obsolete posteriorly. Colour leaf-green, darker along the back, joint 12 tinged with yellowish. Thoracic feet greenish or tinged with black at base.

*Final stage*.—Differs in lacking the black spots. The larvæ enter the ground and form neat, dark brown, elliptical cocoons; that of the ♀ larger than that of the ♂.

Larvæ on poplar at Boston, Mass., in June. The flies emerged the following April.

*Nematus salicis-odoratus*, n. sp.

(The scented willow saw-fly.)

1 ♂, 4 ♀♀. ♀ Length, 5.5 mm. Antennæ 4 mm. long, black, third joint a little shorter than fourth. Head pale testaceous, tips of mandibles blackish brown; a large black spot covering ocelli and reaching nearly to base of antennæ, continued backward more narrowly to the

occiput. Body pale testaceous, with a faint brownish shade; thorax above, except the posterior angles and tegulæ, black, the sutures marked by pale lines; abdomen with a broad black stripe above, not reaching quite to the sides nor to the tip; end of ovipositor sheaths black. Legs concolorous with body, the tips of posterior tibiæ and their tarsi blackish; tarsi of two anterior pair of legs slightly dusky at the tips of the joints. Wings hyaline, nervures black, stigma dull luteous or partly blackish. A black point in the outer half of second submarginal cell.

♂ Length, 4 mm. The black patch on the head has a slight lateral projection, nearly touching the border of the eye; there is a black line on the pleura just below the wings and the venter is shaded with blackish brown on prothorax and mesothorax. Otherwise as in the ♀.

Belongs to the group represented by the species *sumptus*, *plecuricus*, *ribesii*, *lateralis*, *desmodioides*, *fulvipes*, *agilis*, *pallifrons*, *nevadensis* and *trifurcatus*, but does not seem to be identical with any of them.

*Eggs*.—Laid in masses on the under side of a leaf, on the surface without any saw-cuts. The dried, empty skins measure .8 x .4 mm.

*First larval stage*.—Head .3 mm. wide, rounded, shining black as in the next stage.

*Second stage*.—Larvæ eating holes in the leaf, near the eggs. Head rounded, full at vertex, black; width, .5 mm. Body held S-shaped; thoracic feet blackish. Segments annulate shining greenish yellow, pale; the two rows of subventral tubercles visible, smoky; none seen dorsally. Anal plate small, black.

*Third stage*.—Head as before; width, .7 mm.; anal plate and spines black. Lateral and subventral tubercles blackish; subdorsal black spots faintly indicated. Body light green; joints 2, 12 and 13 posteriorly yellowish. Upon approaching a group of these larvæ upon a tree, their peculiar odour is very obvious.

*Fourth stage*.—As in the next stage, except that the black markings are smaller. Width of head, 1.0 mm.

*Fifth stage*.—Head well rounded; clypeus large, quadrate, smooth, shining black, the sutures and antennæ honey-yellow; width, 1.4 mm. Body normal for *Nematus*, terminal segments somewhat swollen. Thoracic feet large, abdominal ones present on joints 6-11 and 13 (20 feet), the last pair small. Five medioventral eversible pale yellow scent glands behind the feet on joints 6-10. These function in the normal position of defense of the larvæ when the abdomen is held up in an S-shape. A

black anal plate with pair of terminal spines. Segments 4-5 annulate, smooth, slightly shining, the tubercles obsolete dorsally, but represented laterally and subventrally by large, smooth, rounded, shining black prominences, largest subventrally. A dorsal and subdorsal row of round black spots with irregular edges, four on each segment in a straight, even line, not shining like the subventral tubercles. Body light green; joints 2, 12 and 13 posteriorly orange. Venter orange-tinted. Thoracic feet black, except at the joints; abdominal ones green.

Larvæ entered the earth without moulting and formed thin, elliptical black cocoons of uniform close texture. Size, 6 to 7 x 2.5 to 4 mm.

Larvæ at Wood's Holl, Mass., in July and August.

#### FURTHER NOTES ON SCALE INSECTS (COCCIDÆ).

BY T. D. A. COCKERELL, LAS CRUCES, NEW MEX.

The numbering of these notes is continued from p. 132.

(9.) *Chionaspis ortholobis*, Comst. In the middle of March Prof. Bruner sent me a *Chionaspis*, which he said was common on cottonwood in Nebraska, being also occasionally found on the white willow. It appeared to me to be a new species, and I was about to name it after its discoverer, but Mr. L. O. Howard, to whom I had sent specimens, declared it was *ortholobis*. This I could hardly believe, as both ♂ and ♀ scales disagreed with Comstock's description of *C. ortholobis*, so I wrote disputing the point, and enclosing further specimens. In due time came a letter stating that both Mr. Howard and Mr. Pergande had taken great trouble to examine numerous specimens and compare them with Comstock's types, and that the identity was practically certain.

The fact, therefore, appears that the original description was inadequate and somewhat inaccurate or misleading, so to save others from the mistake I came so near making, I append details of the Nebraska specimens.

♀ Scale snow-white, broadly mytiliform, slightly convex, straight or somewhat curved, tapering anteriorly; exuvixæ yellowish-white, inconspicuous. Removed from the bark, the scale leaves a white mark, the so-called ventral scale. (Compared with English *C. salicis* received from Mr. Newstead, our species is quite different; the scales of *salicis* are smaller and broader, and not so white, and they have conspicuous orange or orange-brown exuvixæ. *C. salicis* from Rouen, France, received from Mr. Morgan, is the same as the English form.)

♀ as described by Comstock. The lobes retain their brown colour after the rest of the ♀ has become colourless from soda treatment and compression. Rows of gland-orifices indicate obsolete segmentation of terminal portion. Ventral glands in five groups, each of about 22. Mouth-parts very near anterior border.

Eggs dark purple, found with ♀ in March. The ♀, however, is dark brown, not dark purple.

♂ Scale distinctly unicarinate. Comstock laid great stress on the keel-less ♂ scale of *ortholobis*, but my specimens show that it has normally a distinct keel. As Mr. Howard remarks, one can find individuals not showing any keel, and it so happened that Comstock's types were of this kind.

Although my supposed new species was thus set aside, Mr. Howard tells me that he knows of an undescribed *Chionaspis* on Cottonwood.

(10.) *Mytilaspis albus* var. *concolor*, Ckll., common on *Atriplex canescens* at Las Cruces, N. M. On March 19, the males, hitherto undescribed, were hatching.

♂ with the body dark purple, legs very pale yellowish, wings white. Thorax long, wings set far back. Caudal style long. Last joint of antenna shorter than those before it. Tarsus with long knobbed hairs, claw with small knobbed digitules.

(11.) *Aspidiotus abietis* (Schrank), Löw, 1882.

n. syn. *A. abietis*, Comstock.

n. syn. *A. pini*, Comstock, fide Pergande.

Lately Mr. K. Sulc wrote me that the *Coccus abietis* of Schrank was now known to be an *Aspidiotus*; therefore, he remarked, Comstock's *A. abietis* could not be retained, at all events under that name. He was not able to say whether *abietis*, Comst., was the same as Schrank's insect, but in order that I might determine this point, he was so good as to send me examples of *abietis*, Schr., which had been found on *Pinus silvestris* at Chuchle, near Prague, Bohemia.

It happened that I possessed examples of *A. abietis*, Comst., sent from Ithaca, N. Y., by Mr. R. H. Pettit; found on *Abies canadensis*. On comparing these with those from Europe, I was certain that I had only one species before me. Among the Bohemian examples, I found a ♂; it was bright yellow, with a dark brown thoracic band

Being much interested in this discovery, I hastened to communicate it to Messrs. Riley and Howard, at Washington, at the same time sending some of the Bohemian material. A reply came, that Mr. Pergande had examined my specimens and also Comstock's types, the result being that my opinion as to the identity was fully confirmed, and *A. pini*, Comst., was also added to the synonymy! Mr. Pergande's report was enclosed, and it is so interesting that I will take the liberty of reproducing it here:—

“Examined *A. abietis*, Schr., from Bohemia, and compared it with specimens of Comstock's types of *abietis*, and found that both are absolutely alike. Comstock's description of *abietis* agrees with the characters of the immature female, in which there are no groups of spinnerets; while in the mature female there are plainly five groups of spinnerets, exactly as in the European form.

“Among the specimens of Comstock's types of *A. abietis* I came across one specimen, unlike the rest, with but the two anterior groups of spinnerets present; and found it, after comparing it with the description of his *Asp. pini*, to agree with that species in every particular.

“I prepared specimens of his typical *Asp. pini* and compared them also with Comstock's and the European *A. abietis*, and found that all three of them agree perfectly in every respect.

“Those described by Comstock under the name of *A. pini*, are nothing else than a younger stage of *abietis*.”

(12.) *Aspidiotus ancylus*, Putnam. Prof. L. Bruner lately sent me examples of an *Aspidiotus*, which occurs commonly in the City of Lincoln, Nebraska, only on the soft maple. These I found to agree with *A. ancylus*, except for the fact that I could by no means see the grouped glands of that species. Therefore, using Comstock's synopsis (Cornell Report, 1883, p. 56), they would have to be referred to *perniciosus*;—although they were not quite like any *perniciosus* I had ever seen, and the circumstances under which they were found were against such a reference.

I then sent specimens to the Dept. Agriculture, remarking on this anomaly, but stating that I believed they must certainly be some form of *ancylus*. Mr. Pergande again gave assistance, and found that the lack of grouped glands, as in *A. abietis*, was simply a sign of immaturity; this he practically demonstrated by discovering among the material I sent some mature females, which presented the five groups of glands, exactly as in typical *ancylus*.



## ON CHIONOBAS ALBERTA, ELVES.

BY W. H. EDWARDS, COALBURGH, WEST VA.

Mr. Wolley Dod has recently sent me from Calgary quite a number of specimens of this form, and I consider it a valid species. The description, however, of *Alberta* (♂) is quite inadequate. There is great variation in expanse of wing, and in colour. Some examples are dark brown, some are yellow-white, like the pale *N. Ridingsii*; some are decidedly fulvous, like *Varuna*. Of 13 ♂♂, all have one ocellus on fore-wing, and four have two; none have three. Five have one small blind ocellus on hind wings; the rest none at all. In a few the wings are thin, but not so as to permit the ink on the labels to show through, while the larger number are as opaque as in *Varuna*; in the thinner ones the mesial band shows above, defined on both edges; in the others it shows obscurely, and often the inner edge of the band is lost in the dark hue of the base. On the under side the general form of the mesial band of hind wings is circular exteriorly, and in most cases the band is broad; but in other cases it is narrow; the exterior edge is sometimes pretty even, a little erose; in others distinctly crenated, the crenations not prominent; in other cases there is a rounded prominence opposite the cell, closely like *Varuna*. In the larger part of the examples the circular or angular outline is broken near costal margin by a slight sinus. On the inner side the band has a rounded or angular sinus, the deepest part of which falls on median. The largest female expands 1.6 inch., and there is the same sort of variation in colour as in the males. One has no ocellus on fore-wing; one has one; three have two, and four have three; two have no ocellus on hind wing, and all the rest (7) have one each. In both sexes the fore-wing beneath presents a more or less complete band running with the band of hind wings. There is nothing of this in *Varuna*. Mr. Dod sent a large number of eggs, which he obtained by confining the females over grass, though, he says, they laid on everything except the grass.

He also sent me twenty-five true *Varuna*, ♂♀. The *Alberta* are labelled as taken from May 12th to May 23rd; the *Varuna* from May 20th to May 29th.

P. S.—I am able to add that Mrs. Peart reports that the eggs of *Alberta* are ribbed like *Brucei*, and not at all like *Uhleri*, which differs from all the *Chionobas* eggs we have seen. Probably *Varuna* will be found to have ribs of the same type as *Uhleri*.

## CANADIAN HYMENOPTERA—No. 4.

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

My last paper dealt chiefly with Ottawa sawflies, and in the present article I venture to describe a few Western species which have been for some time in my collection, and which seem to be unnamed. Synoptic tables are added as an aid to collectors of these insects.

MONOPHADNUS ATRATUS, *n. sp.*

Male—Length, 6 mm.; black, polished; head wider than thorax, eyes prominent; antennæ short and stout, third joint nearly twice as long as fourth, four to nine sub-equal. Apex of femora and remainder of legs pale. Wings slightly infumated, marginal cross-nervure straight, received in third submarginal cell beyond the middle, second recurrent nervure received about one-fourth from base of same cell, an opaque dot in second.

Described from one specimen received from the Rev. G. W. Taylor, Victoria, Vancouver Island. Allied to *M. nigrellus*, Cress., but in that species the third and fourth joints of antennæ are about equal in length, and the marginal cross-nervure coincides with the apical nervure of third submarginal cell.

The following table may aid in separating some of the species of this genus, but the descriptions of many of the black forms do not give any characters sufficiently distinctive to make the determination of specimens satisfactory. Probably a critical comparison of the types would reduce the number.

## MONOPHADNUS, Hartig.

- |    |      |                                                      |                                                          |
|----|------|------------------------------------------------------|----------------------------------------------------------|
| 1  | (5)  | Ochraceous or lateous.                               |                                                          |
| 2  | (3)  | Head castaneous, also pleura and mesothorax. . . . . | <i>dilutus</i> , Cress.                                  |
| 3  | (4)  | Head black, mouth-parts pale. . . . .                | <i>marginicollis</i> , Nort.                             |
| 4  | (2)  | Head black, mouth-parts and orbits pale. . . . .     | <i>Rileyi</i> , Cress.                                   |
| 5  | (8)  | Dull rufous or chestnut (and black).                 |                                                          |
| 6  | (7)  | Segments of abdomen darker at apex. . . . .          | <i>inæquidens</i> , Nort.                                |
| 7  | (6)  | Segments of abdomen with pale line at apex. . . . .  | <i>lineatus</i> , Kirby.                                 |
| 8  | (11) | Black, thorax partly rufous.                         |                                                          |
| 9  | (10) | Legs black. . . . .                                  | <i>bardus</i> , Say.                                     |
| 10 | (9)  | Legs white. . . . .                                  | <i>caryæ</i> , Nort.                                     |
| 11 | (1)  | Black, thorax black.                                 |                                                          |
| 12 | (13) | Abdomen partly rufo-testaceous. . . . .              | <i>rubi</i> , Harris.<br>var. <i>hudsonicus</i> , Kirby. |

- 13 (12) Abdomen black.
- 14 (21) Tegulæ and collar black.
- 15 (16) Legs black. . . . . *scelestus*, Cress.
- 16 (15) Legs partly white.
- 17 (18) Third joint of antennæ much longer than fourth. . *atratus*, n. sp.
- 18 (17) Third joint of antennæ about equal to fourth.
- 19 (20) Wings pale fuliginous, iridescent. . . . . *nigrellus*, Cress.
- 20 (19) Wings hyaline, faintly clouded at base. . . . . ♀ *tiliæ*, Nort.
- 21 (14) Tegulæ and collar pale.
- 22 (27) Larger species, length about .25 inch.
- 23 (24) Legs below trochanters reddish white, base of femora darker. . . . . *medius*, Nort.
- 24 (25) Knees, anterior tibiæ above, and base more or less of the two posterior pair white. . . . *irrogatus*, Cress.
- 25 (26) Knees, tibiæ, except tips, and four anterior tarsi except apex, white. . . . . *atracornus*, MacG.
- 26 (23) Knees, tibiæ, except tips of posterior, and four anterior tarsi, white. . . . . ♂ *tiliæ*, Nort.
- 27 (22) Smaller species, length .18 inch ; knees, tibiæ and base of tarsi white. . . . . *parcus*, Cress.

TENTHREDO MELANOSOMA, n. sp.

Female—Length, 12 mm.; black, mouth-parts and anterior legs touched with white. Head large, front deeply channeled at each side of ocelli, and slightly roughened, face below antennæ polished; antennæ rather slender, third joint one-quarter longer than fourth (terminal five joints are wanting); clypeus emarginate, with a quadrangular white spot on each side, labrum, base of mandibles and palpi also white. Thorax opaque, without distinct punctuation; anterior legs with a line on apex of femora, a line on the tibiæ, and the tarsi largely, yellowish-white; a yellowish-white line also on intermediate tibiæ within; intermediate tarsi and apical joint of posterior piceous; wings hyaline, slightly infumated beyond middle; abdomen entirely black.

Described from one specimen received from Mr. Wickham, taken by him at Fort Wrangel, Alaska. It seems to be quite distinct from any of the described American species.

*TENTIAREDO NIGRISOMA, n. sp.*

Female—Length, 13-14 mm.; black with pale legs; head very large, wider than thorax; frontal ridges well marked, antennæ slender; dot at inner summit of eye, clypeus, labrum and base of mandibles yellow, palpi rufo-testaceous or yellowish. Thorax opaque, roughened, especially the scutellum; a yellow spot above posterior coxæ; legs, except coxæ and dots on trochanters, entirely rufous in one specimen, and much paler in the other which has the anterior pair, the middle femora and the posterior tibiæ almost yellow; wings yellowish-hyaline, stigma and nervures black, except basal half of costa, which is rufous. Abdomen wide, flattened, shining, entirely black.

Described from two specimens from Victoria, V. I., received from Mr. Taylor (dated 5th June, 1888) and Mr. Wickham. Closely allied to *T. nigricostata*, Prov., of which the type is in my possession, but is larger, the sculpture of the scutellum is coarser, the clypeus and labrum are yellow, the costa is in part rufous, and the posterior tarsi are unicolorous with legs.

*TENTHREDO RUFICOLLIS, n. sp.*

Female—Length, 13 mm.; black, with red legs. Head not nearly so large as in preceding species, and the frontal grooves very shallow; antennæ rather short and stout; clypeus, labrum and mandibles yellow, palpi testaceous. Thorax uniformly, not coarsely, roughened; tegulæ and a large quadrangular spot on collar bright rufous; legs, except coxæ, rufous, the anterior pair a little paler; wings hyaline, nervures piceous, stigma and costa paler. Abdomen long, narrow, shining, entirely black.

Described from one specimen received (through Mr. Fletcher) from Mr. Bean and captured at Laggan, in the Rocky Mts., B. C.

The described American species of *Tenthredo* are now so numerous (over eighty) that it necessitates a great deal of labour to go over all the descriptions. The males in some groups, such as *signata*, etc., are so variable and resemble each other so greatly that they cannot in many instances be satisfactorily separated by the present descriptions. The three species which I have described have the abdomen entirely black, and to assist in determining them I have prepared the following table of the species having the abdomen black, and which seem to be twenty-one in number. A table of the remaining species would be very desirable.

## TENTHREDO, Linn. (species with black abdomen)

- 1 (6) Antennæ black with apical joints white.
- 2 (5) Four anterior tibiæ and tarsi testaceous.
- 3 (4) Collar yellow. . . . . *antennata*, Kirby.
- 4 (3) Collar black. . . . . *nigricollis*, Kirby.
- 5 (2) Four anterior tibiæ and tarsi black and white . . . *grandis*, Nort.
- 6 (1) Antennæ wholly black.
- 7 (8) Wings violaceous, paler at apex. . . . . *nimbipennis*, Nort.
- 8 (9) Wings fuliginous, darker at apex. . . . . *fumipennis*, Nort.
- 9 (7) Wings hyaline or subhyaline.
- 10 (18) Legs black, varied with white or yellow
- 11 (12) Head above antennæ more or less yellow. . . . . *lobata*, Nort.
- 12 (11) Head above antennæ black.
- 13 (16) Posterior tibiæ black.
- 14 (15) Tegulæ and edges of collar straw-white. . . . *flavomarginis*, Nort.
- 15 (14) Tegulæ and collar black. . . . . *melanosoma*, n. sp.
- 16 (17) Posterior tibiæ with white annulus, wings hyaline. *decorata*, Prov.
- 17 (13) Posterior tibiæ yellow except tip, wings yellowish hyaline. . . . . *cinctitibiis*, Nort.
- 18 (10) Legs rufous, varied more or less with black or yellow.
- 19 (20) Pectus rufous. . . . . *rufopectus*, Nort.
- 20 (19) Pectus black.
- 21 (22) Coxæ red. . . . . *rufipes*, Say.
- 22 (23) Coxæ waxen yellow. . . . . *zetes*, Kirby.
- 23 (21) Coxæ black, in whole or in part.
- 24 (25) Scutellum yellow. . . . . *cogitans*, Prov.
- 25 (24) Scutellum black.
- 26 (35) Labrum and clypeus (in part) yellow.
- 27 (28) Femora black, except tip of anterior. . . . . *concessa*, Nort.
- 28 (29) Femora black at base only. . . . . *atrocærulea*, Prov.
- 29 (27) Femora largely red or testaceous.
- 30 (31) Posterior legs black, except apical joint of tarsi. . . . . *uniformis*, Kirby.
- 31 (32) Posterior tarsi and tip of tibiæ black or piceous. . . . . *erythromera*, Prov.
- 32 (30) Legs rufous, except coxæ.
- 33 (34) Tegulæ and collar black. . . . . *nigrisoma*, n. sp.
- 34 (33) Tegulæ and edges of collar rufous. . . . . *ruficollis*, n. sp.
- 35 (26) Labrum and clypeus black. . . . . *nigricostata*, Prov.

## THE COLEOPTERA OF CANADA.

## II. THE SCARABAEIDÆ OF ONTARIO AND QUEBEC.

BY H. F. WICKHAM, IOWA CITY, IOWA.

The beetles of this family are more characteristic of Southern latitudes than of cold climes like Canada ; of about six hundred species known from America, north of Mexico, only ninety-six are recorded from the Provinces which form the subject of the present paper. From all other families they may at once be known by the antennæ, terminating in a club composed of lamellæ or plates, which are capable of close opposition or of separation at the will of the insect. The antennæ of the Lucanidæ somewhat resemble them, but the leaves (or rather plates) are not capable of being closely brought together. The only insect in this country which would be likely to cause a doubt to arise in the mind of anyone is *Nicagus*, described below, in which the lamellæ are not quite approximated on their faces, but the form is decidedly not that of a Lucanid, and no serious trouble would follow its study. The legs of all the Scarabaeidæ are fossorial, often very highly so.

The larvæ are elongate fleshy grubs (fig 20, 2, larva of *Lachnosterna*), usually whitish in colour, with a black or brown head ; the segments of

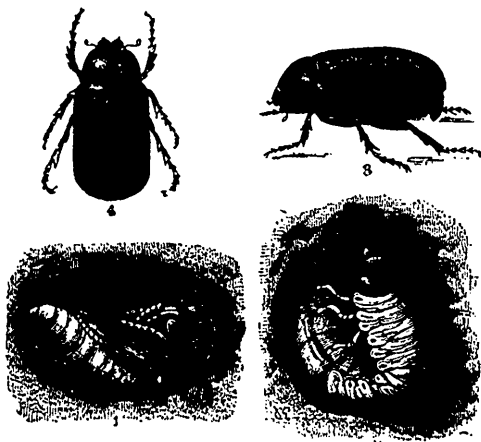


Fig. 20.

the body are transversely wrinkled and the tip of the abdomen bent under, so that when taken from the ground the larva lies on its side. In motions they are slow, in feeding habits diverse—those of the *Laparosticti* or *Coprophaga* living in dung or other refuse matter, such as old skins and feathers, thus rendering man much valuable aid as scavengers, by removing from sight and smell a great

deal of filth. The larvæ of the *Melolonthini* feed on roots of living plants, and often do vast damage, while those of the *Pleurosticti* eat various substances—some of them roots, others old dung, others rotten wood, while still others occur in the nests of ants.

Nearly all the North American genera have been treated from time to time by Dr. Horn, and his papers may be found in the Transactions of the American Entomological Society for the past twenty years. Some of these essays are not now easily obtainable, and while the Doctor has, with his accustomed care, elaborated the characters useful in synoptic work in such a way as to leave apparently little new to be discovered, it is hoped that to many of the readers of the CANADIAN ENTOMOLOGIST the present paper, by bringing together in one easily accessible place the scattered material necessary for a study of the species of Old Canada, may not be useless nor unwelcome. The tables are based on the studies of Dr. Horn, and in one or two cases I have used his own entire in small genera, in which case due credit will be found to be given. In other instances I have been able, having a less number of species to handle, to use more evident characters, such as colour and size in the separation of species. It must be understood that these tables apply to the forms of East Canada *only*, and must not be used for the beetles of the West Coast nor of the United States generally, though many forms from the New England and other Eastern States can be identified with proper care.

It has been thought best, in order to avoid a long, complicated generic table, to treat the family in three divisions, as proposed by Dr. Leconte in the Classification. They may be distinguished structurally as follows; the notes succeeding will make the primary separation more easy to beginners:—

- “I. Abdominal spiracles situated *in the membrane* connecting the dorsal and ventral corneous plates, the last one covered by the elytra . . . . . *Laparosticti*.  
 II. Abdominal spiracles in part situated on the superior portions of the ventral segments, the last one usually visible behind the elytra; the rows of spiracles feebly diverging. . . . . *Melolonthinae*.  
 III. Abdominal spiracles (except the anterior ones) situated in the dorsal portion of the ventral segments, forming rows which diverge strongly. Last spiracle usually visible behind the elytra. . . . . *Pleurosticti*.”

Aside from the characters given above, the *Laparosticti* or *Coprophaga* may be ordinarily known by the possession of the following characters: Form compact, though sometimes moderately elongate; legs usually highly fossorial, claws simple, suture separating clypeus from front of head not transverse, but extending up towards the vertex. The males are often armed with horns or tubercles on the head and thorax. In the absence

of other more technical knowledge, their dung-eating habits will separate most of them from the other sub-families. The Melolonthinæ (of which the "June-bugs" are good examples) are usually of looser, more slender build, the legs especially being elongate and the tarsi sometimes very slender. The clypeal suture is transverse, not extending up on the head, and the club of the antennæ is often elongated in the males. They are entirely vegetable feeders, and occur on leaves and flowers, or flying in the evening—never in dung. The Pleurosticti have mostly very similar habits in the beetle state, though *Ligyris*, which somewhat resembles a *Lachnosterna* in form, but with stouter legs and shorter tarsi, is found under old dung-heaps (not in fresh manure), and *Cremastochilus* occurs in ants' nests. They are ordinarily heavily-built insects, though not always so, and in lack of knowledge of the characters presented by the spiracles, the beginner must rely chiefly on the specific descriptions for classifying his specimens, since I am unable to give other means for distinguishing them as a group, though readily placed properly by anyone who has any acquaintance with the family.

The generic key to the Coprophaga, which follows, is primarily based on the "Classification," though for minor divisions I have not scrupled to use such characters as colour and size—the main object being, of course, the easier identification of their specimens by beginners and others who have not access to libraries, either public or private. Their further study may easily be prosecuted, by those who wish it, at the expense of purchase of the works mentioned above.

## TABLE OF GENERA OF COPROPHAGA.

- A. Abdomen with six visible ventral segments.
  - b. Antennæ with 8 to 10 joints. Mandibles concealed by clypeus except in *Ægialia*.
    - c. Hind tibiæ with a single terminal spur (except in *Canthon nigricornis*), form shorter, rounded.
      - d. Middle and hind tibiæ slender, but little expanded at tip. Head and thorax never horned in either sex. .... *Canthon*.
    - dd. Middle and hind tibiæ much expanded at tip, horns often present.
      - e. Larger species (.32 to 1.10 in.), no onychium.
        - Colour black..... *Copris*.
        - Colours metallic and green..... *Phanaeus*.



- ee. Smaller species, .14 to .34 in. Onychium present..... *Onthophagus*.
- cc. Hind tibiæ with two spurs. Species oblong-convex or subcylindrical, usually small.
- f. Mandibles visible beyond the clypeus..... *Ægialia*.
- ff. Mandibles not visible beyond the clypeus.
- g. First five striæ of elytra reaching apical margin (in the Canadian species).... *Pleurophorus*.
- gg. First five striæ not reaching apical margin. Head punctured or slightly plicate.
- h. Outer apical angle of hind tibiæ prolonged, spiniform ..... *Atænius*.
- hh. Outer apical angle of hind tibiæ obtuse.
- Front tibiæ strongly toothed on outer margin..... *Aphodius*.
- Front tibiæ with outer teeth obtuse except at tip..... *Dialytes*.
- bb. Antennæ 11-jointed, mandibles prominent, visible from above ; form often very convex, rounded.
- i. Club of antennæ very large, lenticular. Brown or spotted species.
- Eyes partially divided by sides of head. Males with short flattened horn..... *Bolboceras*.
- Eyes entirely divided. Males with long slender horn..... *Odontaus*.
- ii. Club of antennæ looser, more flattened. Black bluish or greenish species..... *Geotrupes*.
- AA. Abdomen with five visible ventral segments.
- Tarsi with distinct bisetose onychium. Thorax strongly narrowed before and behind, angulate at middle. Sculpture not very rough..... *Nicagus*.
- Tarsi with distinct claws, no onychium. Thorax less narrowed anteriorly, not angulate at middle. Sculpture very rough *Trox*.

CANTON, Hoffm.

The Canadian species are black or slightly bronzed insects which may be seen rolling balls of excrement from place to place. These balls are buried and the eggs deposited therein, thus ensuring the larvæ a supply of food. They may easily be distinguished from the three following

genera by the much more slender middle and hind tibiæ, which, though very slightly expanded at the tip, are not triangularly dilated. The clypeus has prominent teeth at middle. They may be separated as follows:—

- A. Small species, .25 to .35 in., clypeus 6-dentate, hind tibiæ with two spurs.....*nigricornis*, Say.
- AA. Larger species, .40 to .76 in., clypeus bidentate, hind tibiæ with one spur.
  - Prothorax distinctly granulate.....*levis*, Drury.
  - Prothorax without raised granules, simply scabrous.....*chalcites*, Hald.

Fig. 21 represents *Canthon levis*.

COPRIS, Geoff.

The species of this genus do not transport excrement in balls, but bury it in burrows on the spot. The males have the head or thorax or both variously tuberculate or horned, as in *Onthophagus*, from which they differ by the larger size and the absence of bristle-tipped onychium between the claws. The table gives the chief points of difference:

A. Elytra with eight striæ, front of head semicircular.

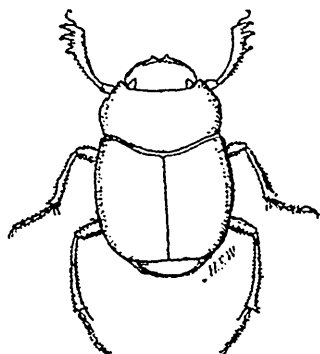


Fig. 21.

Clypeus evenly and densely punctured all around. Size large, .52 to .70 in.....*anaglypticus*, Say.

Clypeus densely punctured at sides, nearly smooth at middle.

Size small, .32 to .44 in.....*minutus*, Dru.

- AA. Elytra with seven striæ, front of head parabolic. Length, .80 to 1.10 in.....*Carolina*, Linn.

Fig. 22 represents *C. anaglypticus*, and fig. 23, *C. carolina*.

PHANÆUS, MacLeay.

The single species reported in the Canadian lists is a beautiful green insect, with the thorax usually coppery-red, the head, in the male, with a long horn. The length varies from .48 to .88 in. It is *P. carnifex*, Linn. The habits are the same as in *Copris*.



Fig. 22.



Fig. 23.

## ONTHOPHAGUS, Latr.

Three species are known from Canada. They are found in dung, under which they burrow in the same manner as *Copris*. They are thus distinguished:

A. Larger species (.16 to .34 in.). Thorax of ♂ protuberant anteriorly.

Black, not shining; carina of vertex in male simple, not produced at the extremities.....*Hecate*, Panz.

Greenish or bronzed; carina of vertex produced at the extremities into horns or acute tubercles in the ♂ *Janus*, Panz.

AA. Smaller species (.14 to .20 in.). Thorax of male without protuberance.

Black, feebly shining.....*pennsylvanicus*, Har.

Some of the specimens of *O. Janus*, in which the head of the males has merely an acute tubercle at the ends of the vertical carina, and in which the colour is a bright bronze or metallic green, have been separated under the name *Orpheus*, Panz.

## ÆGIALIA, Latr.

But one species, *Æ. conferta*, Horn, has been recorded from Old Canada. It is a small insect (.14 to .18 in.), piceous-black or brown in colour, oblong-convex, somewhat broader behind. The thorax has a distinct basal marginal line; the spurs of the hind tibiæ are rather short, broadly expanded at tip, with a translucent border. Other species of this genus will no doubt occur later, but the above characters will distinguish it from any heretofore known in North America.

## PLEUROPHORUS, Muls.

A single species (*P. ventralis*, Horn) has been found in Ontario. It is an elongate, parallel, subcylindrical insect, .16 in. in length, piceous black, with reddish brown legs. The first five striae of the elytra reach the apical margin, and it may thus be distinguished from any Aphodiide in the N. A. fauna. I have seen no specimens.

## ATÆNIUS, Harold.

Small, slender, black insects, somewhat resembling *Aphodius*, but ordinarily smaller and more elongate. They frequently occur on the banks of streams. The species are very difficult to separate, but may be distinguished as follows, after the table given by Dr. Horn:

A. Posterior tibiæ with accessory spinule (a prolongation of the apical margin on the under side adjacent to the spurs).

Clypeus finely punctured, not rugose..... *strigatus*, Say.

Clypeus coarsely punctured or wrinkled.....*cognatus*, Lec.

AA. Posterior tibiæ without accessory spinule.

Black, shining; form slender, elongate; head closely punctate, clypeus broadly and feebly emarginate, elytral intervals convex, abdomen coarsely punctate.....*gracilis*, Mels.

The specimens referred to in the Canadian lists as *A. stercorator*, F., are presumably *strigatus*, which was formerly placed as a synonym of *stercorator*. I am not aware that *cognatus* has been found in Canada, but as it is known from the adjoining regions and might easily be mixed with *strigatus*, I have included it in the table.

#### DIALYTES, Harold.

Small, dark-coloured insects, differing from *Aphodius* in having the teeth of the outer margin of the anterior tibiæ obsolete, except the apical one. As all the known North American species are found in Canada, I can do no better than to reproduce the table given by Dr. Horn, in his Monograph of the Aphodiini inhabiting the U. S.\*

Intervals of elytra flat; clypeus not toothed.....*truncatus*, Mels.

Intervals finely carinate, striæ catenulate; clypeus with an acute tooth each side..... *Ulkei*, Horn.

Intervals strongly elevated; clypeus not toothed, thorax with deep median impression.....*striatulus*, Say.

#### APHODIUS, Illiger.

These are commonly found in dung, and are in fact our most numerous scavengers. Several of them, such as *A. fimetarius*, a large species with bright red elytra; *A. fossor*, a large black species, and *A. inquinatus*, which has a black thorax and variegated elytra, are well known to every collector. Some of the Aphodii are very widely distributed, those mentioned above, as well as *granarius*, our common little black species, being found in both hemispheres. None of them construct balls for transportation, but burrow in and under the dung, and the larvæ go through their transformations on the spot. I have taken pupæ and perfectly fresh imagines of *A. stercorosus* under dry dung at the end of August, in Iowa.

From *Atenius*, the genus *Aphodius* is separable by the outer apical angle of the hind tibiæ being obtuse instead of produced and spiniform.

\*Trans. Amer. Ento. Soc., XIV., 1887.

This character may be tolerably easily made out with a magnifying glass of even low power, and is, at any rate, not likely to cause much trouble, as most of the species can be separated by their facies after a little experience. The Canadian species of *Atenius* are all black, the legs often a little paler, while the *Aphodii*, on the other hand, are usually more or less parti-coloured. From the other neighbouring genera of the group it is sufficiently easily distinguished by the characters given in the table.

The following synopsis is purely artificial, and some of the variable species occur in it twice, but as the object of these papers is simply to make the identification of their species easier for beginners, and not to offer new schemes of classification, it has been thought best to seize upon the most easily seen characters. Immature specimens are easily recognized, as a rule, by the softness of their integuments, and excluding these, we can use colour as a guide to many of the species. I have therefore separated them as follows :

- A. Scutellum long ( $\frac{1}{4}$  to 1.5 the length of the suture), species large.  
 Anterior tibiæ serrulate above the teeth. Colour black, .40 to .44 in. .... *fossor*, Linn.  
 Anterior tibiæ not serrulate above the teeth. Colour variable, .24 to .40 in. .... *hamatus*, Say.
- AA. Scutellum short (not more than  $\frac{3}{8}$  to 1.10 the length of the suture), size variable.
- b. Colour above uniform black or piceous black, tip of elytra sometimes reddish.
- c. Body beneath black or piceous, varying to brownish.
- d. Front distinctly trituberculate.
- First joint of hind tarsus not longer than next two, .16 to .25 in. .... *granarius*, Linn.  
 First joint of hind tarsus slightly longer than next two, .18 to .22 in. .... *ruricola*, Mels.  
 First joint of hind tarsus equal to next three, .14 to .20 in. .... *vittatus*, Say., var.
- dd. Front without tubercles.
- Small species, .16 to .20 in. Elytra reddish at tip. .... *terminalis*, Say.  
 Larger, .28 to .36 in. Elytra unicolorous. .... *oblongus*, Say.
- cc. Body beneath not black (abdomen, metasternum and legs pale yellow,) .18 to .24 in. .... *bicolor*, Say.

- bb. Colour above not uniform black nor piceous black. Variable.
- e. Elytra vittate, or spotted, or both.
- Large, margins of head and thorax paler, .26 to .28 in.....*leopardus*, Horn.
- Smaller, head black, anterior angles or entire sides of thorax paler, .18 to .22 in.....*inquinatus*, Fabr.
- Sides of thorax not paler.
- Smaller (.16 to .20 in.), abdomen black. *vittatus*, Say.
- Larger (.18 to .24 in.), abdomen yellow.....*bicolor*, Say, var.
- ee. Elytra not distinctly vittate nor spotted, sometimes fuscous.
- f. Thorax black or piceous, sides more or less yellow or reddish.
- Elytra bright red, .26 to .34 in.....*fmeterius*, Linn.
- Elytra of greasy aspect, pubescence well marked, colour almost fuscous, .18 to .26 in. *femorialis*, Say.
- Elytra shining, pubescence feeble, deciduous, colour more yellow than fuscous, .22 to .30 in.....*prodromus*, Brahm.
- ff. Thorax black, sides not yellowish, .28 to .30 in.....*rubripennis*, Horn.
- fff. Ferruginous brown, head and thorax slightly darker, .14 to .16 in.....*lentus*, Horn.

Two of the names (*A. hyperboreus* and *A. dentiger*) which occur in the Society's List do not appear in the above table. The former is a variety of *hamatus*, with fainter striæ and flat interspaces, while the reference of a Canadian species to *dentiger*, otherwise known only from South-western Texas and Arizona, is almost certainly incorrect.

#### BOLBOCERAS, Kirby.

Two species are known in North America, of which only the first is reported from Canada. They may be separated thus:

- Colour uniform brown, shining.....*lazarus*, Fabr.
- Colour above yellow, head black, thorax more or less black at base and on disk. Elytra with suture and apex black.....*farctus*, Fabr.

## ODONTÆUS, Kl.

The males of this genus may easily be known from those of *Bolboceras* by their long slender cephalic horn. The females may be placed in their proper genus by the complete division of the eyes by the side of the head. Two species are known from Old Canada, the males of which may be separated by the following table, the characters used having been pointed out by Dr. Horn. Unfortunately, I have seen no females and am unable to give characters for their specific distinction :

- Horn of head fixed, less slender.....*cornigerus*, Mels.  
 Horn of head moveable, more slender.....*flicornis*, Say.

## GEOTRUPES, Latr.

The three recorded Canadian species are large insects, bronzed, greenish or purplish in colour, easily found in dung during the summer. They do not transport balls, but burrow under the mass. The members of this genus have been very thoroughly studied by Jekel, Horn and Blanchard, so that new characters for their separation can hardly be devised. After study of their tables I offer the following, essentially that of Dr. Horn :

- First joint of hind tarsus shorter than next three; claws of middle tarsi chelate in ♂.....*splendidus*, Fabr.  
 First joint of hind tarsus equal to next three; claws of ♂ normal.  
 Elytral striæ with coarse crenate punctures.....*Egeriei*, Germ.  
 Elytral striæ with rather fine punctures.....*Blackburnii*, Fabr.

Fig. 24 shows a specimen of *G. splendidus*.

## NICAGUS, Lec.

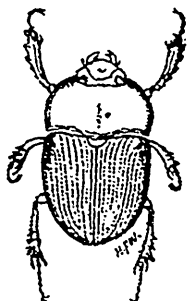


Fig. 24.

The only species is *N. obscurus*, Lec., a reddish-brown or blackish-brown insect, something over a quarter of an inch in length; clothed with short, nearly white hair. The antennal club is large, but the lamellæ do not touch one another at base, though they sometimes meet at the tips. The thorax has a distinct angulation of the sides behind the middle, and is fimbriate with rather long hairs. Dr. Leconte says it has been

found flying around heaps of putrid fish,—this is the only record of the habits that I have met with.

## TROX, Fabr.

The species of Trox are rough, dirty-looking, brown insects, usually more or less incrustated with earthy matter, found under dry carrion and old hides or feathers. They are quite uniform in appearance and are consequently not readily separated, more particularly as they vary to some degree in sculpture within specific limits. I am entirely unable to find constant and easily recognized characters on which to make groups otherwise than those established by Dr. Horn, and the table, therefore, follows his own exactly :

- A. Scutellum hastate (*i.e.*, shaped like a spear-head). Large species.  
Sides of prothorax near base often with feeble incision. Elytra with rows of distinct smooth tubercles. Length,  
.48 to .66 in.....*punctatus*, Germ.
- AA. Scutellum oval, species smaller. Hind femora without spinules on posterior margin.
- b. Tubercles of elytra with black setæ.  
Tubercles elevated, setæ erect, rather long. Length, .25 to .28 in.....*erinaceus*. Lec.  
Tubercles indistinct, setæ short. Length, .36 to .44 in. ....*capillaris*. Say.
- bb. Tubercles of elytra with pale or rufous hairs or scales.
- c. Elytra distinctly tuberculate.
- d. Thoracic ridges straight or nearly so.  
Elytral margin serrulate or crenulate at base. Length, .24 to .32 in.....*sordidus*, Lec.  
Elytral margin entire at base. Length, .40 to .48 in.....*unistriatus*, Beauv.
- dd. Thoracic ridges very sinuous. Length, .20 to .24 in.....*terrestris*, Say.
- cc. Elytral tubercles very indistinct, being replaced by patches of setæ.  
Anterior tibiæ not serrulate above the lateral tooth. Length, .25 in.....*aqualis*, Say.  
Anterior tibiæ serrulate near the base. Length, .20 to .28 in.....*scaber*, L



## CORRESPONDENCE.

OCCURRENCE OF *TRIPTOGON OCCIDENTALIS* IN MANITOBA.

*Sir*,—About four years ago a specimen of this moth came to light one evening through an open window. I saw no more until last year, when I found two large pupæ at the foot of a white poplar tree. One of them produced the perfect insect, but the other was unfortunately a failure, and only produced a number of Tachinous flies. I also caught, attracted by light, a fine female moth which laid several eggs. Unfortunately I was unable to watch them very closely, and several hatched out, and the larvæ died. I succeeded, however, in partially rearing one on the leaves of the white poplar. This is a rough description of the larva:—Colour, polar-green. Head large and square and with an inverted v mark. Yellow or gold ring between first and second, and second and third segments. Yellowish-white stripe from anal horn, which is very small, and whitish forward to the last pair of legs. This after 3rd or 4th moult. After 5th moult, the head became yellowish-white with a pinkish tinge-horn almost disappeared; the line from the horn assumed a purplish shade; slight oblique lines on each segment. Eight pink spiracles on either side. Prolegs and claspers, pink, and above the anus a heart-shaped patch of pale bright green. Colour, whitish poplar-green, skin very rough, 2 yellow bands between first segments as before. Shortly after taking this note the larva died. From time to time I have seen a few specimens of *Macroglossa bombyliformis*, (I use the name of the English lists as I am unable to see any difference, and in any case you will know the insect I mean), but last year it and *M. fuciformis* simply swarmed on the blossom of the wild plum and wild black currant. At the same time I took two specimens of a species of *Deilephila* closely allied to *D. Galii*. This is the second species of this genus that I have taken.

As Southern Manitoba may be unknown to many of your readers, a short description of my place may be of some interest. I am some 120 miles west of Emerson, and 12 miles north of the boundary line. It is intersected by a stream running in a deep ravine, the banks of which are clothed with oak, white and black poplar, elm, birch, ash-leaved maple, willows of very many species, ash, cherries, Saskatoon *Amelanchier alnifolia*, cranberry, gooseberry, currants, plum, hazel and *Cratægus* thorn. The prairie, too, is not the generally conceived grassy sea, but is dotted with clumps of poplar, willow, etc., and with here and there patches of *Eleagnus argentea*, in prairie parlance "wolf-willow," roses, etc.

E. F. HEATH, the Hermitage, Cartwright, Manitoba.

Mailed July 6th.